

### REMARKS

Claims 1 - 11 remain in this application. Claims 1 and 6 have been amended. Reconsideration of this application in view of the amendments noted is respectfully requested.

With respect to claim amendments, claims 1 and 6 have been amended to include a peroxide. These claims have also been amended to rearrange the order of the wording of the claim. Specifically, the limitation "wherein some or all of carboxyl groups of the resin (A) are blocked by 0.01 to 20 parts by mass of a terminal blocking agent (C) based on 100 parts by mass of the resin (A)" has been moved.

The Office Action states that a certified English translation of the foreign application must be submitted in reply to this action. Subsequent to the mailing of the Office Action, the examiner has indicated to applicant's attorney via telephone that there is no English language translation of the priority document required.

Prior to addressing each specific claim rejections based upon the cited references, the following explanation of the present invention is relevant to all of the rejections.

The aliphatic polyester resin composition of the present invention as claimed in claim 1 comprises a biodegradable polyester resin (A) wherein some or all of the carboxyl groups of the resin (A) are blocked by a terminal blocking agent (C), and the polyester resin (A) is crosslinked by at least one crosslinking agent (B) selected from the group consisting of (meth)acrylate compounds and polyvalent isocyanate compounds, and a peroxide. The method for preparing an aliphatic polyester resin composition of the present invention as claimed in claim 6 comprises mixing the biodegradable polyester resin (A) and the terminal blocking agent (C), and then mixing the crosslinking agent (B) and the peroxide with the resulting mixture.

Claim 1 indicates that the aliphatic polyester resin composition of the present invention has a crosslinking structure made by causing the resin (A) to be crosslinked by the crosslinking agent (B) and the peroxide. As described in more detail below, the crosslinking structure made by causing the resin (A) to be crosslinked by the crosslinking

agent (B) and the peroxide is different than that of a resin composition obtained without using a peroxide.

Applicant has included the attached illustrative Figs. A - D with this response to aid in the explanation of the present invention. Attached Fig. A shows how the terminal carboxyl group of a chain of a polylactic acid (biodegradable polyester resin (A)) is blocked by a carbodiimide compound (terminal blocking agent (C)). Thus, as shown in attached Fig. B, since the terminal carboxyl group of the chain of the polylactic acid is blocked, crosslinking occurs at a part other than the terminal end of the chain of the polylactic acid during the subsequent crosslinking reaction. In Fig. B, dimethacrylate is used as a crosslinking agent. However, in this case, if a peroxide is not used as a crosslinking assisting agent, crosslinking is unlikely to occur at a part other than the terminal end of the chain of the polylactic acid.

According to the method and composition of the present invention, crosslinking occurs sufficiently in a biodegradable polyester resin, and thus the crystallization rate of the biodegradable polyester resin increases to extend the crystal part. Accordingly, the durability of the resin (i.e., hydrolysis resistance) is significantly improved. The reason for this is considered to be that it is difficult for water to be included in the crystal structure, thereby making it unlikely for hydrolysis to occur inside the crystal.

In Comparative Example 1 of the present application, terminal blocking alone is performed. In Comparative Example 3, crosslinking (without terminal blocking) is performed. As illustrated in Table 1 of the present application, in each of these comparative examples, hydrolysis resistance is low. For example, in Comparative Example 1, the hydrolysis resistance is particularly deteriorated in 30 days.

Hence, a peroxide is an important component for the present invention. If a peroxide is not used, the following problems arise.

Attached Fig. C shows the chemical structure of an epoxy initiator as a crosslinking agent. Branching occurs as shown in Fig. C. However, the crystallization rate of the

biodegradable polyester resin does not increase even if an epoxy initiator having the bifurcation structure is used.

Attached Fig. D shows how an isocyanate and epoxy acting as a crosslinking agent react with chains of polylactic acids acting as a biodegradable polyester resin (A) when a peroxide is not used. In this case, the isocyanate and epoxy, no matter whether they are monofunctional or bifunctional, react only with the carboxyl groups, and thus the crosslinking structure from the middle of the chain is not made (in contrast to Fig. 2). This does not increase the crystallization rate of the biodegradable polyester resin. Therefore, the hydrolysis resistance based on the improvement of the crystallization obtained by the present invention does not occur.

Furthermore, according to the preparation method of the present invention as claimed in claim 6, a biodegradable polyester resin (A) and a terminal blocking agent (C) are mixed, and then a crosslinking agent (B) and a peroxide are added into the mixture. Thus, crosslinking sufficiently occurs in the biodegradable polyester resin as described above, thereby increasing the crystallization rate of the biodegradable polyester resin to extend the crystal part. Consequently, a resin composition with sufficient durability (i.e., hydrolysis resistance) is obtained.

On the other hand, if a biodegradable polyester resin (A), a terminal blocking agent (C), a crosslinking agent (B), and a peroxide were to be mixed together at the same time, the terminal blocking agent would react with the peroxide and the crosslinking agent, which would deter the desired terminal blocking and crosslinking reactions from sufficiently occurring. As a result, the terminal blocking would be insufficient, the crystallization rate of the resin would be slow, and thus a resin composition with insufficient durability would be obtained.

Likewise, if a crosslinking agent (B) and a peroxide were mixed into a biodegradable polyester agent (A), and then a terminal blocking agent (C) were to be added, the remaining crosslinking agent and peroxide that have not been used for the crosslinking reaction and a radical such as a hydrogen radical with very high reactivity

would react with the terminal blocking agent. As a result, sufficient terminal blocking would not occur, and a resin with insufficient durability would be obtained.

None of the cited references disclose a polyester resin composition as in claim 1 wherein some or all of the carboxyl groups of a biodegradable polyester resin (A) are blocked by a terminal blocking agent (C), and then the resin (A) is crosslinked by at least one crosslinking agent (B) selected from the group consisting of (meth)acrylate compounds and polyvalent isocyanate compounds, and a peroxide. Further, none of the cited references disclose a method for preparing an aliphatic polyester resin composition as in claim 6, wherein a biodegradable polyester resin (A) and a terminal blocking agent (C) are mixed, and then the crosslinking agent (B) and peroxide are mixed with the resulting mixture.

Turning to the specific rejections, claims 1 – 4 and 6 were rejected under 35 U.S.C. Section 102(b) as being anticipated by Miyamoto et al. (JP 2001-151871, hereinafter “Miyamoto”). Applicant respectfully traverses this rejection.

Miyamoto fails to disclose an aliphatic polyester resin composition and method for preparing the same as claimed in claims 1 and 6 and as described in detail above. Miyamoto discloses an oxy acid-based aliphatic polyester composition containing an oxy acid-based polyester, especially a lactic acid-based polyester and a crosslinking agent (paragraph [0001] and claim 4). However, Miyamoto does not disclose the aliphatic polyester resin composition of the present invention as described above. In paragraph [0010] of Miyamoto, it is merely disclosed that in order to obtain the polyester with which the oxy acid system polyester contains three or more hydroxyl groups in one molecule, copolymerization may be carried out using the epoxy compound. This paragraph does not relate to the use of a blocking agent.

Miyamoto is essentially different from the present invention because in Miyamoto the crosslinking reaction with polyfunctional isocyanate advances remarkably by increasing the hydroxyl-group concentration of the oxy acid system aliphatic series polyester to obtain a hard urethane system polymer (paragraph [0029]).

For all of these reasons, Miyamoto does not disclose the present invention as claimed in claims 1 and 6. Hence, applicant submits that claims 1 and 6 are patentable over Miyamoto. Claims 2 – 4, depending from claim 1, are also patentable over Miyamoto. Applicant therefore respectfully requests that the Section 102(b) rejection of claims 1, 2, 3, 4, and 6 as anticipated by Miyamoto be withdrawn.

Claims 7 – 10 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Miyamoto in view of Kimura et al. (U.S. Patent No. 5,618,911, hereinafter “Kimura”). Applicant respectfully traverses this rejection.

Applicant incorporates by reference the arguments made above with respect to the patentability of claim 1 over Miyamoto. Based upon those arguments, claim 1 is patentable over Miyamoto. Claims 7 – 10, depending directly or indirectly from claim 1, are also patentable over Miyamoto, and any combination of Miyamoto with Kimura.

Therefore, applicant submits that claims 7 – 10 are patentable over Miyamoto and Kimura, and respectfully requests that the Section 103(a) rejection of claims 7 – 10 as being unpatentable over Miyamoto in view of Kimura be withdrawn.

Claims 5 and 11 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Miyamoto and Kimura in view of Kitazono et al. (JP 2002-338796, hereinafter “Kitazono”). Applicant respectfully traverses this rejection.

Applicant incorporates by reference the arguments made above with respect to the patentability of claim 1 over Miyamoto. Based upon those arguments, claim 1 is patentable over Miyamoto. Claims 5 and 11, depending directly or indirectly from claim 1, are also patentable over Miyamoto, and any combination of Miyamoto with Kimura and Kitazono.

Therefore, applicant submits that claims 5 and 11 are patentable over Miyamoto, Kimura, and Kitazono, and respectfully requests that the Section 103(a) rejection of claims 5 and 11 as being unpatentable over Miyamoto and Kimura in view of Kitazono be withdrawn.

Claims 1 – 5 and 7 – 11 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Ueda et al. (JP 2003-147182, hereinafter “Ueda”) in view of Matsumoto

et al. (JP 2002-030208, hereinafter "Matsumoto"). Applicant respectfully traverses this rejection.

Ueda discloses a biodegradable polyester resin composition obtained by melt kneading a (meth)acrylic ester compound, a peroxide and a layered silicate (Abstract). This corresponds to Comparative Example 3 in the present application. Further, Matsumoto discloses a polylactic acid resin composition wherein a part of the carboxyl terminal group of the lactic acid is blocked (Abstract). This corresponds to Comparative Example 1 in the present application. As is evident from Table 1 of the present application, the compositions in Comparative Example 3 (corresponding to Ueda) and Comparative Example 1 (corresponding to Matsumoto) have low durability. Consequently, combining Ueda with Matsumoto to improve the durability of a resin composition would be unexpected from the teachings of Ueda and Matsumoto and therefore not obvious to one skilled in the art. In contrast, the present invention produces remarkable effects such as the improvement in durability by using terminal blocking and crosslinking in the manner disclosed and claimed in the present application, which is unexpected and unforeseen to one skilled in the art that is presented with Ueda and Matsumoto.

For these reasons, applicant submits that claim 1 is patentable over Ueda and Matsumoto. Claims 2 – 5 and 7 – 11, depending directly or indirectly from claim 1, are also patentable over Ueda and Matsumoto. Therefore, applicant respectfully requests that the Section 103(a) rejection of claims 1 – 5 and 7 – 11 as being unpatentable over Ueda and Matsumoto be withdrawn.

Claims 1 – 4 and 7 – 10 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Kubo et al. (JP 2000-017037, hereinafter "Kubo") in view of Matsumoto. Applicant respectfully traverses this rejection.

Applicant incorporates by reference the arguments made with respect to the patentability of claim 1 over Matsumoto. Matsumoto does not disclose an aliphatic polyester resin composition as claimed in claim 1. Further, Kubo fails to disclose an aliphatic resin composition as in claim 1 wherein some or all of the carboxyl groups of a

biodegradable polyester resin (A) are blocked by a terminal blocking agent (C), and then the resin (A) is crosslinked by at least one crosslinking agent (B) selected from the group consisting of (meth)acrylate compounds and polyvalent isocyanate compounds, and a peroxide.

For these reasons, applicant submits that claim 1 is patentable over Kubo and Matsumoto. Claims 2 – 4 and 7 – 10, depending directly or indirectly from claim 1, are also patentable over Kubo and Matsumoto. Therefore, applicant respectfully requests that the Section 103(a) rejection of claims 1 – 4 and 7 – 10 as being unpatentable over Kubo and Matsumoto be withdrawn.

Claim 6 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over Ueda and Matsumoto, or Kubo and Matsumoto, in view of Miyamoto. Applicant respectfully traverses this rejection.

Applicant incorporates by reference the arguments made above with respect to the patentability of claim 6 over Miyamoto. As argued above, Miyamoto does not disclose the method as claimed in claim 6. Further, none of Ueda, Kubo, and Matsumoto disclose a method for preparing an aliphatic polyester resin composition as in claim 6, wherein a biodegradable polyester resin (A) and a terminal blocking agent (C) are mixed, and then the crosslinking agent (B) and peroxide are mixed with the resulting mixture.

For these reasons, claim 6 is patentable over any Ueda, Kubo, Matsumoto, and Miyamoto. Therefore, applicant respectfully requests that the Section 103(a) rejection of claim 6 as being unpatentable over Ueda and Matsumoto, or Kubo and Matsumoto, in view of Miyamoto be withdrawn.

Claims 5 and 11 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over Kubo in view of Kitazono. Applicant respectfully traverses this rejection.

Applicant incorporates by reference the arguments made above with respect to the patentability of claim 1 over Kubo. Based upon those arguments, claim 1 is patentable

over Kubo. Claims 5 and 11, depending directly or indirectly from claim 1, are also patentable over Kubo, and any combination of Kubo with Kitazono.

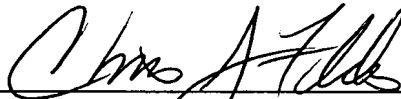
For this reason, applicant respectfully requests that the Section 103(a) rejection of claims 5 and 11 as being unpatentable over Kubo in view of Kitazono be withdrawn.

This amendment and request for reconsideration is felt to be fully responsive to the comments and suggestions of the examiner and to place this application in condition for allowance. Favorable action is requested.

Respectfully submitted,

Takuma Yano et al.

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A handwritten signature in black ink, appearing to read "Chris J. Fildes", is written over a horizontal line.

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